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MANAGING WHITEWATER RECREATION ACTIVITIES ON THE TIETON RIVER

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This paper was prepared in partial fulfillment of the professional development for the outdoor recreation management program at Clemson University. It in no way reflects USDA Forest Service policy, nor are the opinions expressed those of anyone other than the author.

Abstract: *Recreationists who engage in whitewater activities on the Tieton River were sampled to determine the implications of current use levels on the quality of the recreation experience. Social and physical factors were examined. User preferences about possible management actions to achieve desirable use levels were solicited and recommendations were made to management. Demographic data was collected and compared to similar information in recent national studies.*

Key Words: *whitewater, rafting, crowding, user satisfaction.*

653 - Forests

EXECUTIVE SUMMARY

The Tieton River has become a popular whitewater recreation setting. It's popularity stems from the class 2 and 3 rapids it provides, coupled with the fact that it is the foremost late season whitewater opportunity in the state of Washington. Approximately 6000 people use the river during a three week period created by the release of water from a Bureau of Reclamation impoundment in September each year. Although water releases are controlled and predicable, managements ability to manipulate the amount and timing of release is controlled by irrigation and anadromous fisheries needs downstream and elsewhere in the watershed. Release regimes that benefit recreation are a by-product of those primary needs. However, no other river in the state provides similar whitewater recreation opportunities during this period. As a result, the District hosts 12 to 16 commercial outfitter guide operations from various locations in Washington, as well as a significant number of private users during that period.

Concentrated and increasing use of a 21 mile stretch of the river has been of growing concern to local managers. Existing management problems such as heavy use in the riparian zone, parking and crowd control adjacent to State highway 12, and growing septic and sanitary problems are some of the physical effects of this activity. Beyond those concerns, there are social factors associated with the activity that are effecting the quality of the experience that users are deriving. This report attempts to provide Naches Ranger District managers with a clear description of the scope of opportunities, challenges and concerns related to current and potential use of the Tieton River for whitewater recreation.

The current level of whitewater activity on the river is generating perceptions of crowding among users that indicate use is exceeding the social carrying capacity of the river. As encounter levels increase, people are sensing greater inconsistencies between the experience private and commercial users are seeking. Management can expect to see users displaced to other locations and activities if current trends persist. Sampling efforts indicate that a significant number of both the commercial and private groups using the river felt crowded.

Recommendations for management of this situation focus on increased coordination with adjacent land owners and management agencies, as well as commercial outfitter guides and private rafting/kayaking organizations. There is a need to develop logistical plans and strategies for hosting and transporting users so that the social and physical effects of crowding can be mitigated. Until the needed management actions can be implemented, it is recommended that use be limited to 1990 levels.

TABLE OF CONTENTS

PAGE

CHAPTER I - INTRODUCTION 1

Statement of Problem 2
Hypothesis 2
Delimitations 2
Basic Assumptions 2
Limitations 2

CHAPTER II - REVIEW OF LITERATURE 4

Quality and Satisfaction 4
Social/Psychological Carrying Capacity 5
Social and Demographic Trends and Implications 7
Demand 11

CHAPTER III - PROCEDURES 13

Selection of Subjects 13
Selection of Instrumentation 13
Collection of Data 14
Treatment of Data 14

CHAPTER IV - ANALYSIS OF DATA 16

CHAPTER V - SUMMARY AND CONCLUSIONS 24

Procedures and Findings 24
Conclusions 24
Discussion and Implications 25
Recommendations 26

BIBLIOGRAPHY - LITERATURE CITED 28

APPENDIX 29

Map of Study Area 30
Questionnaire 31

CHAPTER I

INTRODUCTION

This report documents efforts to provide the Naches Ranger District with information necessary to manage whitewater recreation activities on the Tieton River. These efforts are necessary to determine if it is appropriate to allow use of the river to increase during the peak whitewater period. This issue is significant because requests for commercial outfitter guide permits on the river have increased annually for the last five years. Private (free) use of the river has also increased over that period. Since management actions that reduce recreation opportunities are often controversial, it is wise to determine how and when to control use before it exceeds acceptable levels. This project examines current use on the river and provides local managers with recommendations to cope with it.

The Tieton River has become a popular whitewater recreation setting. The experience associated with the river's class 2 and 3 difficulty ratings, coupled with the unique late season rafting opportunity the river offers, have led to approximately 6000 people rafting or kayaking the river annually. This use takes place during a three week whitewater season in early September each year. As a result of the demand for whitewater recreation on the Tieton, the District hosts twelve outfitter guide operations. Those businesses provide 75% of the total use on the river.

Concentrated and increased use of a 21 mile section of the river has been a growing concern for local managers. Heavy dispersed camping adjacent to the river, vehicular traffic, parking and crowd control near State highway 12, as well as growing septic and sanitation problems are some of the physical effects of the whitewater activity. In addition, there are social impacts resulting from crowded river conditions that affect the quality of the recreation experience. This situation warrants examination because the effects of use are approaching the limits of management's ability to control through the special use permits which govern commercial use of the river. To date, the bulk of the controls have been placed on the commercial permit holders. As a matter of equity, it is necessary to determine how to manage that segment of the users who don't pay a fee to use the river. Management of this activity is further complicated by the fact that use occurs on a mixture of land ownership; that is, management of public lands in the area is the responsibility of three separate agencies.

Information from this study should be shared with other agencies and individuals interested in managing recreation activities within confined physical and/or social tolerances. That portion of the data collected in this survey that deals with crowding was collected in a manner that would supplement data analyzed by Shelby, Vaske, and Heberlein in their comparative analysis of aggregate data from crowding studies. The results of this study should also be disseminated to those agencies or individuals affected by it's content.

Statement of Problem

This study attempts to answer the following questions: (1) Are the current use levels on the river, and the associated social implications of that use, degrading the quality of the recreation experience during the peak whitewater period? (2) Is the carrying capacity of adjacent facilities currently being exceeded; and how is that use complicating management of the area? (3) How can use levels and other factors that can be manipulated by management be used to solve problems associated with items (1) and (2) above, and what recommendations for management are warranted?

This effort is part of a larger analysis which is considering the physical, biological, social and economic impacts of the Tieton River whitewater use on the human environment using National Environmental Policy Act parameters.

Hypotheses

This study was undertaken using the working hypothesis that current use levels on the Tieton River are approaching the limits of the social carrying capacity. It was also hypothesized that parking and other use at facilities in the area are beyond their current capacity. Visitor to staff ratio is included in the "facility carrying capacity".

Delimitations

The study area covers approximately 7000 acres, along a section of the Tieton River 1/2 mile wide by 21 miles long. This zone includes all or portions of 10 sections of land owned by private individuals or corporations. The geographic boundaries of this analysis are approximated on the map contained the appendix of this report.

The people contacted during data collection include individuals who have purchased space in river rafts from commercial outfitter guides as well as those rafters who belong to organized whitewater groups, such as the Washington Recreational River Runners, who have used the river each season since 1986. In addition, an attempt was made to contact people who use the river in their own or rented rafts and kayaks.

Basic Assumptions

Among the basic assumptions applied in this study is the belief that crowding and perceived crowding are similar enough in nature to be considered one in terms of their effect on social carrying capacity and quality of experience. Also, it is assumed that crowding data and conclusions can be used to determine if social carrying capacity needs to be established. Further, it is assumed the literature that summarizes research efforts relating to social psychological carrying capacity can be applied to this situation, and that statements, concepts and conclusions drawn by researchers in literature that date back to the early 1980's are still valid.

The boundaries of the facilities used for parking and dispersed camping are uncontrolled in many cases. It is assumed that the existing physical impacts such as lack of vegetation and compacted soil form the boundaries of those areas and that use leading to expansion of those boundaries is unacceptable.

Limitations

Conclusions drawn from this study are limited by the fact that data was collected from subjects whose experience on the river occurred 4 months to 2 years prior to contact being made.

Sufficient time to establish carrying capacity during the period allotted for this project was lacking. Therefore, if it becomes necessary to determine carrying capacity and allocate use, another phase of planning will be needed. This situation could occur if proposed management actions fail to hold perceptions of crowding or use at facilities within acceptable limits.

Some of the data used in this study was drawn from a small sample that measured the values of private rafters and kayakers. Although sampling efforts for that segment of the whitewater user population netted only 16 responses, the perceptions of that user group were clear. The sample lumped private rafters and kayakers into one strata and was drawn from among a group of individuals belonging to one organized group. From a pure statistical perspective, there are some negative implications associated with the data that was generated. A sample of rafters and kayakers that includes members of the public at large is likely to generate results that reflect a broader opinion base and perhaps be more meaningful. Never the less, the responses seem to accurately reflect the opinions of the free use population using the Tieton River. This conclusion could be validated by a sampling effort during the upcoming season. Future samples could segregate kayakers from rafters and sample a spectrum of private users that is broader in terms of their affiliation and origin.

CHAPTER II

REVIEW OF LITERATURE

This chapter contains a summary of literature applicable to this study. Literature reviewed falls into four main categories; quality and satisfaction, social/psychological carrying capacity, social and demographic trends, and demand. The most pertinent findings and conclusions associated with each piece of literature are summarized.

A. QUALITY AND SATISFACTION

In his article "Quality in Recreation Experience," Perry J. Brown discusses the importance of places and experiences in managing for quality in recreation. Traditional approaches to understanding quality are outlined, as well as the need for additional study. The author also refers to research done by others throughout this publication. Findings and conclusions stress that quality is often determined by how well desired outcomes are realized. When what is realized matches what is desired, a quality recreation experience is being attained. This literature also examines the issue of how to create and maintain the conditions needed for people to obtain a quality experience.

Brown makes a point relevant to this study when he states that in situations where encounters with others is decreasing the quality of the experience, management often regulates the amount or distribution of use. This is usually done to ensure that the opportunity for the desired recreation experience is maintained.

Attempts to understand quality recreation usually focus on the environment in which the activity is taking place. Research indicates that although recreation places are important, it is the character or attributes of those places that are significant in terms of meeting the various desires of users (Clark and Stankey 1979). Stankey and Brown conclude that tools such as the Recreation Opportunity Spectrum (R.O.S.) and Limits of Acceptable Change (L.A.C.) are usefull in managing for quality recreation experiences.

Brown makes several points about the need for further study that are important to remember. The effects of recreating with others on quality and satisfaction in recreation are only partially understood. In addition, the effect of information is vague. Brown feels that providing information can greatly effect satisfaction by influencing expectations about activities, places, and experiences. In general, he feels our understanding of quality and satisfaction would be increased by studying recreation settings, the role of information, and how places and recreationists interact to produce quality experiences.

Daniel R. Williams discusses the concept of satisfaction as a measure of recreation quality and the factors that appear to influence satisfaction in his article "Great Expectations and the Limits of Satisfaction; A Review of Recreation and Consumer Satisfaction Research." Other researchers referred to in this publication are also cited below.

Satisfaction in recreation endeavors is related to user's perception of crowding, goal attainment, and resource impacts. Although studies indicate a poor correlation between density and satisfaction, there is a consistent link between perceived crowding and satisfaction. Graefe and others (1984) found that as use levels and encounters increase, satisfaction tends to decline. Brown concludes that use levels have an indirect effect upon satisfaction through their influence on perceived crowding.

Goal attainment also influences user satisfaction. Recreationists involved in consumptive activities such as hunting and fishing are sometimes less satisfied with a particular outing than nonconsumptive

recreationists. The disparity in satisfaction appears to be related to whether people meet the goal they set out to achieve when they choose an activity.

Other sources of dissatisfaction appear to be linked to resource impacts and individual motivation. Impacts such as litter and vandalism are particularly negative (McCool and Peterson 1982; Downing and Clark 1979; Stankey and Schreyer (1987). Other research suggests that dissatisfaction depends on individual differences in motivation or previous experiences rather than environmental conditions (Vaske and others 1982; Graefe and others 1986). Satisfaction is often measured by how well a leisure activity is perceived to fulfill basic needs or motives. Williams suggests that satisfaction is most likely to be defined as the extent to which the recreation experience is an expression of one's self. Self affirmation, valuing the hunt not the harvest, the experience as opposed to the product, is an important distinction to many recreationists.

B. SOCIAL/PSYCHOLOGICAL CARRYING CAPACITY

Social/psychological carrying capacity is the level of use that best achieves the given purposes of the recreation system (Stynes 1977). In general, researchers believe that carrying capacity must be defined in light of the management objectives for the area in question (Lime 1974; Lucas & Stankey 1974). In their book "Carrying Capacity in Recreation Settings," Shelby and Heberlein establish a basic framework to guide research and decision making in situations with carrying capacity implications. That framework is based on the belief that establishing social carrying capacity requires a description of what is happening in a recreation system, i.e. the number of people entering an area, their distribution in space and time, the activities they are engaged in, and the impacts these factors generate. When that description is reasonably complete, management has the information necessary to evaluate how the area should be managed. This approach considers impacts, management parameters and objectives, as well as values in the decision making process.

The authors point to Jacob & Schreyer's conclusion that most carrying capacity conflicts do not revolve around resource questions; they are generally value disputes. Such conflicts are essentially human and are unlikely to be resolved by collection of biological information. Although it is not appropriate to discount resource damage as an important decision making variable, it is important to recognize that there are two aspects associated with resource damage. There is a component of resource damage related to impacts or environmental change, as well as a component that relates to the acceptability of change. Deciding the limits of acceptable change may be the key to determining carrying capacity (Frissell and Stankey 1972).

Shelby and Heberlein feel establishing carrying capacity requires specific social judgements about impacts. In addition, evaluative standards that indicate how much impact is acceptable are needed. Often the standards are based on subjective impressions. One way to develop evaluative standards is to measure individual user preferences. When preferences tend to agree, a group standard emerges. By gathering and examining data on individual preferences we can find out if people agree enough about factors, such as an acceptable number of encounters for river running, to develop a group standard.

Shelby, Vaske, and Heberlein analyzed data from 35 studies on the subject of crowding in their publication "Comparative Analysis of Crowding in Multiple Locations: Results from Fifteen Years of Research."

Often, research on crowding has focused on the relationships between visitor numbers and the attitudes and perceptions of recreationists. Individual, social and psychological characteristics are usually seen as mediating the relationship between numbers of visitors and their perceptions of crowding. This work has resulted in a good understanding of psychological factors such as motivations,

expectations and preferences (Schreyer & Roggenbuck 1978; Absher & Lee 1981; Ditton, Fedler, & Graefe 1983; Shelby Et. Al 1984). However, there is still relatively little data dealing with questions such as: Is one site more crowded than another? Has the level of crowding changed over time? Do participants in certain recreation activities typically feel more crowded than those engaged in others? Comparative analysis is used to explore these questions and can yield answers that single studies can't. This work uses a single item scale which asks people to indicate how crowded they felt at the time of their visit. Responses are given along a nine item scale (numbers 1 thru 9), where 1 indicates "not at all crowded" and 9 indicates "extremely crowded".

The available evidence suggests the following generalizations about crowding are true:

> *In situations where 0-35% of the visitors feel crowded there is probably some management or natural factor that is limiting use. These settings may offer unique low-density experiences. Managers should be concerned about preserving those factors which maintain these relatively rare opportunities.*
>
> *The 35-50% range indicates a problem situation does not exist at this time. Visitors are not likely to be experiencing access, displacement or crowding problems. As above these situations may be offering unique low-density experiences that will change with increased use.*
>
> *The 50-65% range is considered "high normal". These situations should be studied if increased use is expected. Use levels associated with these situations may be approaching maximum carrying capacity. Careful scrutiny is warranted here; anticipate problems and plan for future management. It is important to remember that it is almost impossible to reduce use levels without significant controversy once capacity has been exceeded.*
>
> *The 65-80% range is considered above carrying capacity; studies and management are recommended to preserve the experience. A definite problem is thought to exist when use levels climb to this level. If visitor numbers and impacts are important factors in managing the experience, it makes sense to freeze or reduce use levels immediately when crowding reaches this level.*
>
> *Situations where 80-100% of the visitors feel crowded are recommended to be managed for high-density recreation experiences, Management may want to dedicate such areas to the activities causing the overuse even though the quality of the experience suffers. These situations provide an opportunity to study displacement or substitution.*

These generalizations are based on data from 35 studies in 59 settings, involving responses from 17000 individuals.

This analysis also suggests that perceptions of crowding vary by season of use, setting, resource availability, accessibility, and management actions.

Researcher Alan R. Graefe in his publication "Social/Psychological Carrying Capacity" discusses the scientific and judgemental elements of managing carrying capacity.

He states that managing carrying capacity is the act of maintaining a quality recreational experience in the face of increasing numbers of visitors. Graefe writes that the dominant themes and trends evident in existing literature are contained in four major principles:

1. *Managing carrying capacity involves a wide range of variables that may influence the quality of the outdoor recreation experience. The response of visitors to varying use levels is unpredictable; visitors tend to be affected by a series of interrelated impacts that result from use of a*

certain area. Social and environmental impacts can lead to different perceptions and behavioral responses by visitors. Encountering resource impacts may contribute to a perception of crowding, dissatisfaction, and conflict between users. Also, when these feelings occur together they tend to reinforce one another.

2. *Carrying capacity is a management tool that can be used to provide a certain type of quality experience. Determining the carrying capacity of a system is gradually being replaced by emphasis on identifying and maintaining the conditions that will produce the desired quality experiences.*

   Carrying capacity determinations require value judgements about the type of experience a given area is intended to provide. These determinations are not solely matter of research.

   "Limits of acceptable change" and "visitor impact management" are processes for identifying unacceptable conditions, probable causes of these conditions, and alternative management solutions.

3. *People do not respond the same way to encounters with other visitors. Responses vary according to their backgrounds, i.e. past experience, motivation and attitude. The importance of solitude, for example, varies by activity and depends on many personal characteristics (Graefe and others 1984). Often, a recreationist's response to contacts with others depends on the behavior of those encountered. Mode of travel and group size seem to be important variables along with time and location of encounter (Hendee & others 1978; Stankey 1973). There is nothing simple or uniform about the relationship of use to quality of experience; yet that relationship is essential and basic to establishing social carrying capacity.*

4. *The carrying capacity for a given area depends upon the objectives and standards for management of that area, activities and site specific issues, the type of use, and the particular time and place.*

   Use of the carrying capacity tool is not appropriate in those situations where no clear relationship between numbers of visitors and impacts occurring on the site or area exists. In some cases it is more productive to focus management strategies on factors contributing to the problem conditions rather than attempting to determine carrying capacities.

C. SOCIAL AND DEMOGRAPHIC TRENDS AND THEIR IMPLICATIONS

"An Overview of The Relationship Between Social and Demograhic Factors and Outdoor Recreation Participation," by Lawrence A. Hartmann and H. Ken Cordell, examines commonly studied relationships, including age, gender, income, education and occupation. This paper uses data from the 1985-87, Public Area Recreation Visitor Study (PARVS).

Findings and conclusions indicate the following:

Age is commonly cited as the demographic factor with the strongest correlation to recreation participation (Mueller & others 1962). Generally, as one gets older, participation in recreation activities moves toward less physical activities, and eventually all outdoor recreation participation declines with age (Kenyon 1966; Snyder & Spreitzer 1973; Unkle & Estridge 1977). Participation is thought to decrease faster with age for single persons than for married persons or those with children (Witt & Goodale 1981). Participation in some activities such as developed camping, seem to be relatively age-independent. Other activities, such as walking and driving for pleasure

actually increase with age. Older individuals tend to travel farther and stay longer than younger travelers.

Variety in participation rates according to gender appear to be more related to social preferences among men and women than the biological differences between the sexes (Cheek & Burch 1976). Gender has been shown to have an effect on participation in strenuous activities in several studies; with a higher participation in such activities by men (O'leary and others 1982). In other activities these same studies show very little difference in participation according to gender. Males are thought to participate more frequently in water and forest based recreation (Kelly 1980). One summary of recreation surveys concludes that women take a somewhat greater part in cultural activities, while lagging behind men in outdoor recreation and active sport spectatorship (Unkle 1981; Young 1983; and Kelly 1980). Nonworking women show slightly higher participation rates then employed women in most leisure activities, but the similarities in leisure participation rates between the sexes are more striking than the differences (Zuzanek 1971). There are few reliable conclusions that can be drawn in this area, and social change is occurring at such a rapid pace that it is difficult to support conclusions about participation rates by gender for many activities.

One summary of studies dealing with income indicated that income does not form tastes, rather it limits their expression (O'Leary & others 1982). PARVS data indicates that annual participation in some activities is relatively independent of income, i.e. walking for pleasure. Other, more capital intensive activities, such as sailing are highly income-dependant. Income affects length of stay with higher income folks staying longer on site than others. One way travel increases with income but there may be intervening variables such as age that cloud that apparent conclusion.

A review of literature related to education and participation concludes: the rate of participation for most leisure and recreational activities and their spectrum increases almost linearly with education. White (1975) found education, when combined with age and income, to be the best predictors of recreation participation. PARVS information indicates that college educated individuals are the largest users of Federal and State recreation areas. High school educated respondents to PARVS stayed the longest at sites studied and highly educated visitors tend to travel farther to their recreation areas.

Several researchers recognize a general, positive relationship between the amount and type of recreation participation and white collar occupations (O'Leary and others 1982). Professionals seem to be participating in a wider spectrum of leisure activities and at a higher rate than other occupational groups. Laborers and resource workers report the lowest rate or participation (Zuzanek 1978). Attempts to tie recreational activities with particular occupations have generated considerable disagreement among researchers. Overall, it seems that there is no consensus in recreation research about the appropriateness of using occupation as a predictor of recreation participation. Other factors such as income and social status may be better measures, with occupation expressed through them.

Laura B. Szwak discusses various social and demographic characteristics such as time, work, income, family, health, and urbanization in terms of their influence on outdoor recreation participation. This literature uses data from the 1982-83 Nationwide Recreation Survey and is taken from an article entitled "Social and Demographic Trends Affecting Outdoor Recreation."

Szwak found time to be the most important variable influencing participation and interest in outdoor recreation. Leisure time has dropped by 31% in this country since 1973 or about 8 hours per week (Louis Harris and Associates poll 1984). This has affected our attitudes toward convenience products

and services. Time control is becoming a necessity that people are willing to pay for. This time crunch is in part due to an increasing range of options on how to spend time.

Time spent at work is increasing. Figures indicate that eight million Americans work at least 8 hours per week at home in addition to the 40 hours they spend at work. In addition, most people are satisfied with the amount of time they spend at work. Few workers say they would trade less income for more leisure or family time (note: this could be changing). The American economy is transitioning to one of services, with ninety percent of the 16 million new jobs expected by 1995 anticipated to be in the service industry. Many of the services offered will be available to people where they live. The personal computer, for example, will allow people to segment their work and leisure in order to gain more control of their time.

Szwak also found that the amount of money people have seems to effect how much time they spend recreating. Adults over 50 years of age account for half of all discretionary spending in this country, and this group is the fastest growing group in the U.S.. The second largest group of consumers are teen-agers. Many teen-agers decide how a portion of the families income is spent and nearly half have part-time jobs. Teen-agers are the most avid outdoor recreation participants both in terms of number of activities and frequency.

Family composition influences the demand for recreation, with participation in outdoor recreation increasing as children grow up. Changes in household composition also influence interest and participation in recreation. The availability of recreation companions is decreasing as household structures change. One quarter of all U.S. households are occupied by people who live alone; this frequency has tripled since the 1960's. By the year 2000, over 7 million more people are expected to be living alone. Many will be elderly women, traditionally the least active group of outdoor recreationists.

About 80% of the population is expected to live in metropolitan areas by the year 2000. In the 80's the suburbs expanded to become separate, dispersed communities with a metropolitan nature. Not all of these suburbs are tied economically to nearby cities within commuting distance. People are searching for open space (Herbers 1987). In the 1950's, there were about 13 acres of land available per U.S. inhabitant; by the year 2000, that figure is expected to drop to 5 acres.

Szwak concludes a clean, healthy environment remains important to people at every age. Concern for health, fitness and well being is a shared value as well. This is evidenced by the fact that people are spending more time in outdoor recreation pursuits to improve their health. It is likely that we will continue to link outdoor recreation with better personal health and a clean environment.

"Social Factors in Recreation Participation and Demand: Implications from National Surveys" by Joseph T. O'leary, F. Dominic Dottavio, and Francis McQuire focuses on the 1982-83 Nationwide Recreation Survey. Estimates of participation in activities included in the Resources Planning Act (RPA) analysis and other related surveys, trends, implications and issues are discussed. Findings and conclusions are as follows:

> *There is a general participation rate of 28% for boating among those participating in the National Recreation Survey. The demographic pattern for boaters is somewhat upscale, with a propensity to participate among the higher income and education levels. Gender differences are moderate, and boating participation holds up well through middle age. These same relationships are true for canoeing, kayaking, sailing, motorboating, and other boating and watercraft sports. Canoeing and kayaking had the largest growth rate of any sampled activity since the 1960 base survey related to this data.*

The President's Commission On Americans Outdoors identified major trends that will affect the provision of outdoor recreation over the next 20 years. The diversity and scope of the issues associated with these trends reinforces the need for a continuous monitoring of social and economic issues and their relationship to outdoor recreation. These trends are:

1. *Changing social and demographic composition will substantially alter the demand for, and effective supply of, recreation opportunities. Aging, population growth in rural communities in the south and west, increasing immigration and cultural diversity, working women, changes in the basic family unit, household size, educational levels, health consciousness and the effects of baby boomers seem to imply:*

    - *There will be an increasing need to plan and structure vacation time.*
    - *Child care and location of residence will become major issues.*
    - *The home will become increasingly important as a workplace, school, and entertainment center.*

2. *Barring any major global crisis, the economy of the U.S. will prosper over the next 20 years. If we can solve the Federal deficit problem the future looks bright - more goods and leisure, and longer lives. Implications may be as follows:*

    - *Recreation opportunities traditionally provided by the public sector will shift to the private sector.*
    - *The "pay as you go" concept may be used more frequently by public providers of recreation.*
    - *Smaller families will result in more discretionary income.*
    - *Jobs available in recreation will increase as the demand for recreation increases.*
    - *Duel family incomes will result in more discretionary income.*
    - *There will be growth in the private sector to fill the voids.*
    - *The budget deficits will mean that less Federal support will be available for publicly supplied recreation.*

3. *During the period 1985 to 2000, technological advances will change virtually every aspect of American life as we know it today. These technological changes will occur at an increasing rate and will affect the provision and use of outdoor recreation. Potential implications include:*

    - *Increased efficiency and productivity among recreation suppliers.*
    - *Increased efficiency of travel, which will significantly alter travel and tourism patterns.*
    - *Prolonged active lifestyles; a balance between recreation and health.*
    - *New materials for recreation products.*
    - *Preference switches among users toward high tech. activities.*
    - *New recreation products and improvements on existing technology.*

4. *Environmental degradation will continue to be a concern in the United States and will result in increased pressure to set aside public reserves. Implications include:*

    - *Increased conflict among competing users of resources, i.e. water.*
    - *Decreased use of affected areas for recreation due to concern for environmental quality.*
    - *An increased need to set land aside in developing communities for parks and greenways designed specifically for recreation use.*

5. *The availability and price of energy will remain speculative. The percent of real income spent on oil products will increase. Implications include:*

   - *Modifications will be made to existing recreation facilities and those newly constructed.*
   - *Providers of recreation have and will alter their operational patterns such as time of opening and season of use.*
   - *Energy conservation consciousness will increase.*

6. *There will be increased emphasis on grass roots politics, use of referendums, accountability of institutions and partnership formation among private and public organizations. These trends mean:*

   - *Agencies providing recreation will have to be in tune with the needs and desires of recreationists who provide vital funding.*
   - *Big government and government regulations are unpopular. New initiatives and creative financing will be necessary for the operation and management of public recreational opportunities.*

7. *Transportation systems will become heavily impacted by the recreational user and will become increasingly crowded. Implications include:*

   - *More use close to home will occur.*
   - *Alternative modes of transportation, other than automobiles, will become popular; passenger trains, ships, buses will fill certain niches.*

D. DEMAND

This information is taken from a Clemson Short Course, 1990 presentation.

Demand, for the purposes of this report, is defined as the number of activity-specific recreational trips away from home that people would be willing and able to take after they have considered how much the trip will cost in terms of dollars and time.

Surveys indicate continued growth in demand for outdoor recreation can be expected. Relative popularity of various recreation activities seems to indicate upward trends in water based activities involving canoeing and other boating. The percentage of our population participating in those activities was 9% and 7% respectively, according to a survey conducted from 1985-87. This seems to correlate with the most recent PARVS study, which indicates that about 9% of the recreating public participates in canoeing/kayaking activities for approximately 6 days each year. In general, current participants are young (60% are under the age of 35) and male (54%). This is changing, however, with many women and individuals over 35 years of age beginning to participate. Participants tend to earn incomes consistent with their age group nationwide.

An analysis of persistent trends and their future implications done at the 1985 National Outdoor Recreation Trends Symposium projected increased participation in physically demanding activities. Those activities are appealing to baby boomers because they are available to a broad spectrum of incomes and can generally be practiced close to home. Outdoor risk and adventure recreation, including white water sports, is expected to continue to grow in popularity. This demand is expected to come from a more urbanized, mobile and affluent population. A possible dampening effect resulting from increased transportation costs and competition for available resources could occur (Ewart 1989).

Demand for rafting and tubing is expected to grow 111% from the 8.9 million trips taken nationally in 1987.

Micheal W. Mayfield and Jennifer L. DeHart in their publication "Whitewater Rafting in the Southeatern United States: Current Status and Constraints on Future Growth" discuss anticipated growth in the whitewater rafting industry.

Mayfield and DeHart conclude that future growth of the whitewater rafting industry will be controlled by hydrologic considerations, bureaucratic regulation, and customer willingness to participate in the sport during the cooler months of the year. They feel this is true despite remarkable growth in the sport over the last two decades.

The commercial white water industry has grown at a rate of approximately 10% over the past decade in the Southeast. Some outfitters predict this growth will continue into the twenty-first century, and have capitalized their operations through extensive borrowing in preparation for it. Hydrologic, environmental, and psychological constraints on growth may make those investments somewhat hazardous. The authors suggest those constraints may be felt as follows:

> *Federal and State agencies are seeking to strictly limit the number of people using some rivers during peak season due to perceived crowding and environmental degradation. Customers on the New River in West Virginia, for example, perceive crowding to be a significant problem, and numerous studies have revealed substantial environmental degradation as a result of recreation use of rivers (J.W. Roggenbuck, N.P.S. 1984). In general, river managers are denying requests for additional outfitter licenses in order to curb use rates. Limitations on the number of customers per day are also becoming common. Underutilized capacity still seems to exist on most commercially rafted rivers on weekdays and during low water or cool weather periods. Outfitters are attempting to increase off-peak use by lowering fees and advertising the benefits of trips during low use periods. These efforts have generated little success to date (commercial rafters on the Tieton River offered lower fees for weekday trips for the first time in the 1990 season without success).*
>
> *Dams regulate all but one of the heaviest used rivers in the Southeast (as well as the Tieton River), generating highly reliable flows. Attempts to establish rafting operations on non-regulated streams have failed (the Chattoga is a notable exception). Flows suitable for whitewater use on non-regulated rivers generally occur in late winter and spring. These periods, due to water and air temperatures, are out of phase with peak demand periods. Outfitters in the Southeast have not been able to attract paying customers in the cooler months. Well equipped noncommercial recreationists use the rivers during these periods, but few appear to be willing to pay for the use (M.W. Mayfield 1988).*
>
> *Negative impressions gained from trips that in some way do not satisfy customers result in participants reporting their dissatisfaction to an average of 10 others (H. Assael 1987). Also, many guests move to other rivers due to recommendations from commercial guides.*

CHAPTER III

PROCEDURES

Selection of Subjects

The sampling effort for this project was intended to determine the feelings, desires, and expectations of private and commercial whitewater enthusiasts who use the Tieton River. The sample included patrons of 12 commercial outfitter guides that use the river, as well as members of the Washington Recreational River Runners Club. It is assumed that the views of the individuals sampled accurately represent current and future users. All contacts supplied by the club were asked to participate in the sample; this was necessary due to the low number of contacts available from the private user segment. Club membership includes private whitewater rafters and kayakers. Many of the members sampled had used the river during the 1990 season. Individuals from the commercial group were drawn randomly from lists of patrons supplied to the District by the permit holders. These lists contained names of 1990 patrons only.

The sampling effort was designed with the help of researchers from the Pacific Northwest Experiment Station in Portland, Oregon. It was implemented by mailing a questionnaire to 278 individuals in the user segments mentioned above. The questionaire was sent to 250 individuals who rafted through a commercial permit holder and 28 individuals who rafted or kayaked as free use recreationists on the river. All those sampled were users of the river during the peak use period in recent years (1988 through 1990). An example of the questionnaire is contained in appendix A of this report)

Selection of Instrumentation

The questionnaire borrowed heavily from one used by managers at Columbia Gorge National Scenic Area to collect data on the White Salmon River. It was used to collect data related to frequency of use, travel distance, user perceptions regarding crowding, number of encounters and factors affecting the quality of the experience. An overall quality rating for the users most recent trip and demographic information about age, gender, education, occupation and income was also collected. The questionnaire solicited user preferences about techniques that could be used to manage encounters and general suggestions to improve the quality of the whitewater experience. This instrument was selected because: (1) it had been used successfully in the past, (2) it would provide the information needed by managers to resolve key issues and (3) it would help identify conditions that produce quality outdoor recreation experiences as seen by the various users.

The questionnaire was modified to include Heberlein and Vaske's single item measure of perceived crowding. This was necessary to provide information essential to the process of determining whether a crowding problem exists on the Tieton River during peak whitewater use periods. Once that information was analyzed, the need to determine social carrying capacity could be considered. The questionnaire was also modified to collect information about users occupation.

The objectives for data collection included a desire to compare the two groups of users and to collect the data necessary to make reliable estimates for the entire population of users. Statistical consultation indicated that the best comparisons can be made when the sample size in each group is about the same. That allows overall estimates to be made by weighting responses by the number of people in each group. In addition, it was recommended that the sample be large enough to generate 50 reponses from each user segment. The sample size was controlled by the acceptable variation in responses to key questions (i.e. question 4, perceived crowding). The actual sample size was calculated using "Lipsey's Design Sensitivity: Statistical Power for Experimental Research." A completely random sample was suggested, avoiding stratification by gender, age or other categories. It was felt that proper

implementation of this sampling procedure (including follow up contacts to minimize non-responses) would generate reliable results.

Collection of Data

The questionnaire asked subjects to communicate their perceptions of how crowded they felt, as well as what physical or social experiences may have added to or detracted from their last trip. It also queried users about the acceptability of various management actions. These actions could be used to maintain, in an equitable manner, acceptable use levels on the river. Subjects were asked to rate the overall quality of the trip and what, if anything, could be done to improve trip quality. Demographic information about age, gender, education, income and occupation was collected in order to compare the user population to those surveyed in national studies.

Information about the effects of this activity on the physical environment was borrowed from an environmental analysis of whitewater activities on the Tieton River. Procedures used in collection of that information were designed to comply with the National Environmental Policy Act (N.E.P.A.) i.e. site specific information was collected according to standards identified in the N.E.P.A. analysis process . Specific problems addressed in that analysis included impacts on the riparian zone, water quality, facility capacity, as well as liability and special uses administration issues.

The questionnaire was implemented through mailings to individuals as mentioned above. Approximately 33 per cent of those individuals returned completed instruments for analysis. Substantially incomplete questionnaires were returned to respondents for completion. A second mailing was made to nonresponders, and follow up was attempted at an organizational meeting to obtain as many responses as possible from the private user segment. The responses were grouped into a commercial user group and a second group of private users, which included kayakers and rafters. The questionnaires were completed by individuals in their home settings 4 months to 2 years after their last whitewater experience on the Tieton. The vast majority of the mailings went to individuals who had used the river during the 1990 season. Approximately 10 weeks were allotted from early December of 1990 to mid-February of 1991 for the collection and analysis of the data.

The questionaire was administered by the Naches Ranger District staff including the author of this report and one recreation planner on the District staff. Input regarding the statistical reliability of the responses was acquired with the help of a statistician from the U.S.D.A. Forest Service Pacific Northwest Research Station in Portland, Oregon.

The same questionaire had been used successfully in the past, so initial testing of it was accomplished by reviewing responses from the first 50 questionaires sent out. Results indicated a response rate of over 25% could be expected, but that a few individuals were failing to answer the questions on the back side of page 1 of the questionnaire. It was felt that these second-page questions were being mistakenly overlooked. An attempt was made to correct this by printing a note on the bottom of the first page to alert the respondants to the presence of all the questions.

Treatment of Data

Data was manually analyzed by separating responses into commercial and private user groups. Responses were summarized for each of the twelve query areas (see questionnaire). Through the use of averages, ranges, and grouping of responses, data that could be used to formulate conclusions was processed and displayed.

Procedures and techniques used for analysis of the data are as follows:

1. *All responses were categorized according to the nature of the respondent's last trip, i.e. all those whose last trip was with a commercial guide were placed in the commercial patrons strata.*

2. *Responses indicating the number of times the respondent had floated the river were averaged.*

3. *Responses indicating the number of miles driven from the user's residence to the Tieton River were averaged and a range recorded.*

4. *User perceptions of crowding were grouped into 3 broad categories; those feeling not at all crowded to slightly crowded, moderately crowded to crowded, and those feeling extremely crowded. A per cent comparison of individuals who felt crowded verses those who did not was also developed for comparison to established parameters.*

5. *The number of times respondents saw other parties floating the river were averaged and a range recorded.*

6. *The effects of experience factors on the quality of the trip were clustered by response and a percentage for each was generated, i.e. 83% of the commercial patrons felt getting wet added to the quality of the trip.*

7. *Responses relating to seeing other users were recorded in a narrative fashion.*

8. *Responses relating to the overall quality of the trip were grouped and a percentage calculated for each group, i.e. 61% of commercial respondents felt their last trip was excellent.*

9. *Responses detailing how the quality of the trip could be improved were recorded narratively.*

10. *Respondents preferences about possible management actions were grouped and a percentage was calculated, i.e. 56% of commercial patrons favored voluntary registration to help the Forest Service monitor use levels.*

11. *Suggestions for maintaining desired use levels were recorded in a narrative manner.*

12. *Demographic information was recorded according to response and percentages applied, i.e. 40% of the commercial respondents were in the 30 to 39 year old age class, and 58% work in white collar occupations.*

The questionnaire addressed certain elements of the "Statement of Problem" and "Hypotheses" sections contained in Chapter I of this report. Specifically, the responses to questions about return use, perceived crowding, encounters, the effects of experience factors on trip quality, rationale for the effects of seeing others, and overall trip rating help management determine if current use levels are degrading the quality of the whitewater experience. Further, this data could be used to determine the validity of the hypothesis that current use is approaching the limits of the social carrying capacity of the area. Data collected in the environmental analysis associated with this study provides the information needed to determine if the capacity of facilities used in this activity is being exceeded. This relates to validation of the second hypothesis and the second element of the Statement of Problem listed in Chapter I. Information gathered from responses to questions 9 through 11 provide insight about possible management actions to be considered (element number 3 of the statement of problem for this project).

CHAPTER IV

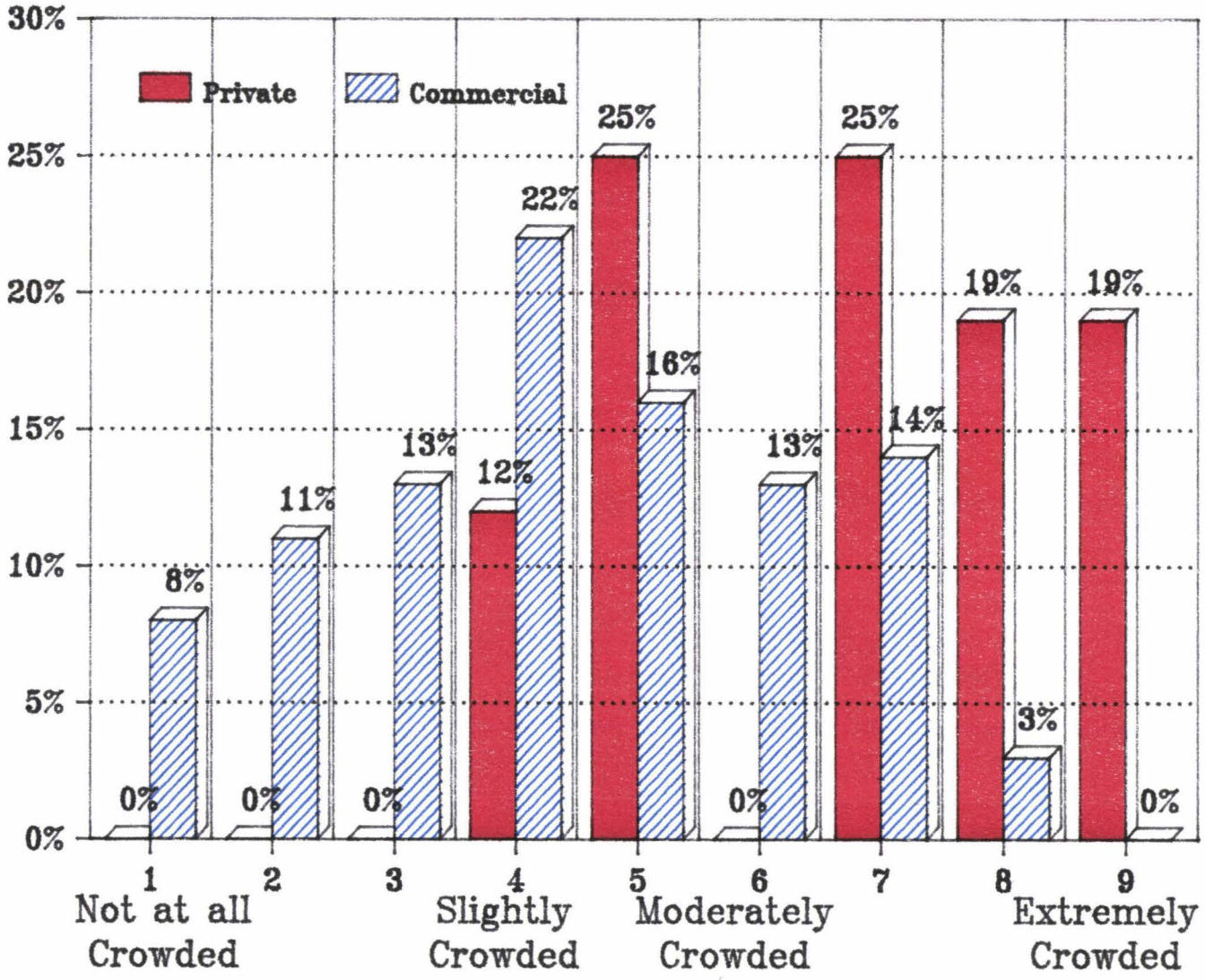
ANALYSIS OF DATA

Review and analysis of data shows that private whitewater recreationists responded more often to the sampling effort than their commercial counterparts. Private boaters returned questionnaires approximately twice as frequently as the commercial users. Considering the recreation experience needs and goals of the private users, it is generally true that they are more at risk than the commercial patrons if present trends on the Tieton River persist.

Seventy-four percent of the whitewater recreationists on the Tieton River are patrons of commercial guide operations and the vast majority (93%) are rafters. Most whitewater recreationists travel 120 to 130 miles to use the river, and administrators report that many users stay overnite before running the river. The vast majority of the trips occur on weekends. Travel distances of this magnitude are consistent with national averages for weekend trips. Many of those who use the river are return visitors. Thirty-one percent of the users have made two or more trips on the river. There is a clear difference in total trips among user groups however; private users who responded to the sample averaged 11 floats, while commercial patrons generally have made 2 trips on the Tieton.

Although private users feel more crowded than their commercial counterparts, a significant number of both groups (81% of the commercial and 100% of the private users) felt crowded to some degree. It is notable, however, that the magnitude or degree of crowding expressed by users varied significantly by user type. As the following graph indicates, seventy percent of the commercial users felt the crowding to be no worse than moderate, and only 3% felt extremely crowded. The converse appears to be true for private boaters. Sixty-three percent of the private users felt the crowding was above moderate levels, with over one-third feeling extremly crowded. The number of times users saw other parties floating the river was consistent with their perceptions of crowding. Private users observed an average of 16 other parties each, while commercial users saw 11. Some private boaters reported seeing as many as 100 other parties during each trip.

USERS' PERCEPTION OF CROWDING



Analysis of how various experience factors affected trip quality yielded mixed results. Getting wet, seeing large trees, experiencing clear water, and visiting with people from other parties had the most significant positive effects on trip quality. Other findings indicate that seeing homes, buildings and bridges has no appreciable effect on the quality of the trip, and data also indicates a reasonably litter-free environment currently exists.

Specific comments related to sharing the river with others showed that users feel that encountering others has both social benefits and costs. The opportunity to meet people and exchange stories about the experience is of value to both groups. These feelings seem to correlate with the "Visiting with Others" responses shown on the following chart, which tend to be positive in nature. Conversely, those aspects of the activity that contribute to seeing others (rather than socializing with them) tend to generate negative feelings. Seeing others can lead to rude behavior, difficulty in accessing or leaving the river, feeling rushed, decreased solitude, feelings of insecurity and safety concerns in some cases. Seeing other boaters drew a strong negative reaction from the private user group. While over half of the respondents from both groups felt visiting with others added to the quality of the trip, 67% of the private users expressed negative feelings about "seeing" other boaters.

Many users rated the quality of the trip as good to excellent. In fact, all commercial respondents were in one of these two categories. Trip quality ratings were more disparate among the private whitewater users. Approximately one in ten private users felt the trip didn't work out well, and 27% wish a number of things could have been different. In general, private boaters are seeking changes that relate to control of people, while commercial users are most often seeking facility related changes.

Findings associated with factors seen or experienced, as well as their effect on trip quality and trip quality ratings by group are summarized in the following tables.

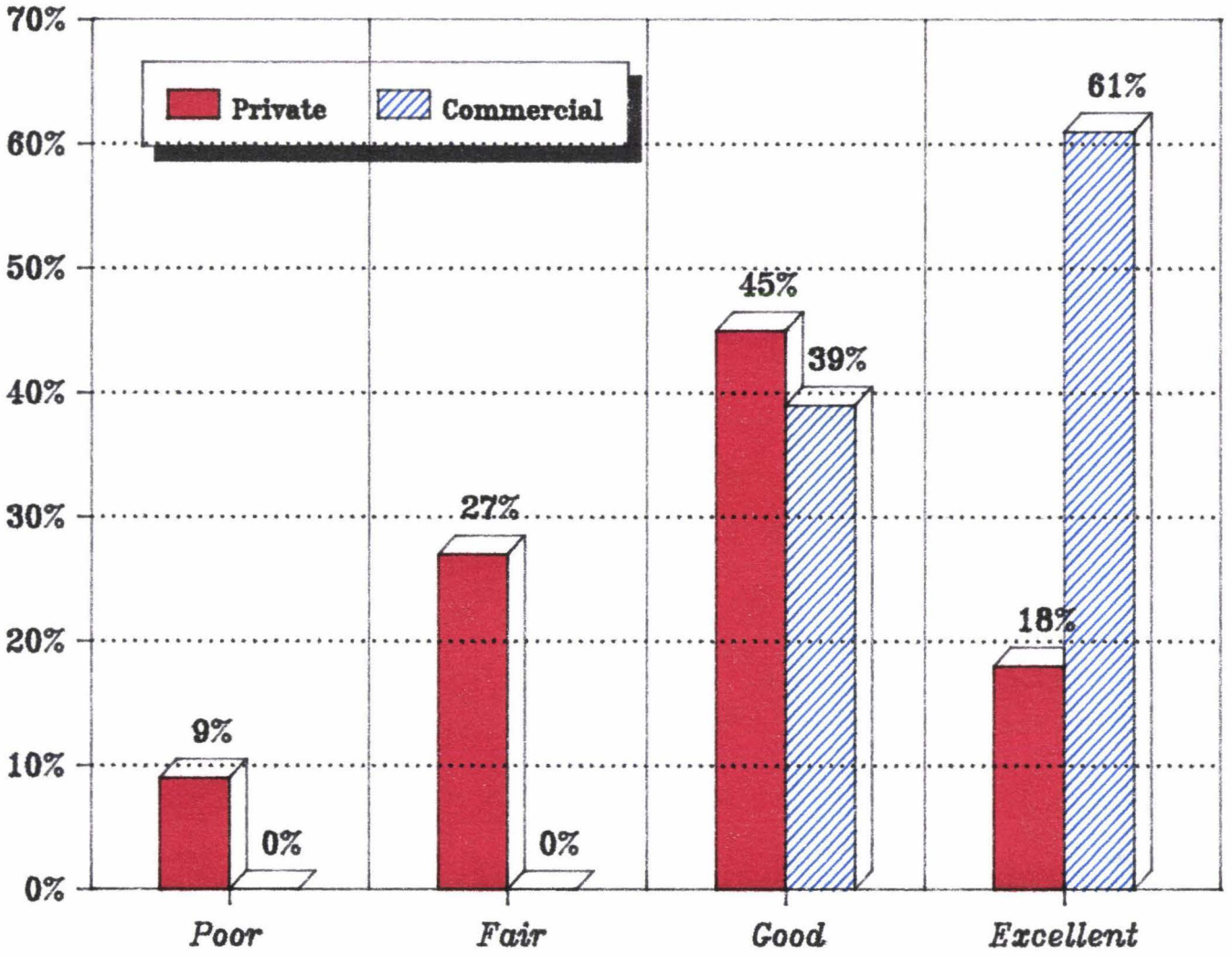
EXPERIENCE FACTORS/TRIP QUALITY

Affects of Experience Factors on Quality of Trip

Experience Factor	Did Not Encounter		Added to Quality		No Effect on Quality		Reduced Quality	
Litter	82%	56%	0%	0%	3%	6%	15%	38%
Wildlife	66%	88%	31%	12%	3%	0%	0%	0%
Home/ Buildings	9%	6%	9%	0%	78%	63%	4%	31%
Bridges	1%	0%	27%	6%	64%	81%	8%	13%
Large Trees	1%	13%	78%	50%	21%	37%	0%	0%
Getting Wet	2%	0%	83%	69%	14%	31%	1%	0%
Clear Water	14%	8%	71%	81%	14%	11%	1%	0%
Seeing Other Boaters (Besides your Group)	0%	0%	31%	25%	55%	8%	14%	67%
Visiting with Boaters Outside your Party	18%	0%	54%	56%	25%	38%	3%	6%

Commercial Patrons ■ Private Users ■

OVERALL TRIP RATINGS



Analysis of individual comments showed support for the use of permits and limitations in order to manage use levels. Both groups also felt that extending the rafting season would help maintain desired use levels. Although private users seem more tolerant of government control, users generally prefer management actions that employ self-regulation. For instance, voluntary registration to monitor use levels and voluntary scheduling of launches received strong support from both groups. The following table displays user preferences for possible management actions:

PREFERRED MANAGEMENT ACTIONS

Maintaining Desired Use Levels

Possible Mangement	Favor	Don't Favor But Would Accept	Not Acceptable	No Opinion
Voluntary registration	56% 43%	19% 36%	15% 21%	10% 0%
Mandatory registration	26% 28%	38% 43%	25% 29%	11% 0%
Limit number of watercraft per party.	27% 29%	28% 21%	36% 36%	9% 14%
Limit number of people/party	23% 14%	28% 36%	38% 43%	11% 7%
Voluntary scheduling of launch times.	51% 43%	18% 29%	21% 29%	10% 0%
Mandatory scheduling of launch times.	24% 14%	41% 43%	30% 43%	5% 0%
Limit number of float parties per day.	35% 28%	27% 36%	26% 36%	12% 0%
Limit commercial use/unlimited private use.	7% 57%	31% 29%	56% 14%	6% 0%
Mandatory permit system.	24% 0%	37% 36%	30% 57%	9% 7%

Commercial Patrons ■ Private Users ■

Demographic data indicates that whitewater users of the Tieton River are similar to their counterparts nationwide. The average user is in their late thirties to early forties. Range within the groups is somewhat varied; the bulk of the private users are in the 40 to 49 year old age class, while many of the commercial users are 30 to 39 years old. Most users have post high school education, work in white collar occupations, and belong to households with total incomes in the $30,000 to $60,000 range. A significant number of users (15-22%) are in the $80,000 plus income bracket.

Data relating to the capacity of undeveloped recreation sites indicates that these facilities have resulted from recurrent use for a variety of dispersed recreation activities and their utility is diminished due to a lack of formal design and planning. All parking areas follow natural ground contour and parking is limited to areas unobstructed by uneven ground, rocks and large vegetation. Several of the sites are best suited to high clearance vehicles due to the uneven driving surface. Only one of the 12 undeveloped sites currently being used has a prepared driving/parking surface. Approaches are narrow with poor site distance to the state highway; many also have adverse exit grades that make merging with highway traffic difficult. Vegetation at some of the sites presents a moderate fire risk when combined with hot catalytic converters commonly present on modern vehicles. Natural fire breaks, however, would likely confine fires to a small size in all but the most adverse burning conditions.

There are 5 developed recreation sites used during peak whitewater periods. Four of those sites are managed as fee campgrounds. When the sites are used as designed, 87 camp units are available to the public. During peak use these campgrounds are also used as parking areas, often causing use to exceed capacity by approximately 250 cars. This overuse occurs during the day only. At present levels, this short duration crowding does not appear to be damaging the facilities and therefore is not intolerable from the standpoint of facility management. Where parking overflows onto the shoulders of Highway 12, safety and legal concerns warrant coordination with other agencies to address facility needs and avoid potential accidents. Management of use within these developed facilities requires the presence of a campground host and administrative personnel to assure compliance with regulations, i.e. payment of fees.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study determines how current use on the Tieton River, and the associated implications of that use, affect the quality of whitewater recreation activities on the river. User crowding and the capacity of various facilities are examined to (1) determine the effects of current use levels, and (2) prescribe actions to manage for the desired recreation experience.

Efforts associated with this study supplement and support an environmental analysis to determine whether it is appropriate to issue additional permits for outfitter guide operations on the river. What follows is a summary of procedures, findings, conclusions, implications and recommendations associated with this project.

Procedures and Findings

Two groups of whitewater recreationists who use the Tieton River were surveyed. Those who are patrons of commercial outfitter guide operations, as well as those who raft and kayak on the river as private individuals or groups. Data was gathered through the use of a questionnaire that measured the effects of social and experiential factors, determined user preferences about possible management actions, and collected demographic information. Information related to the capacity of facilities and improvements was generated during the data collection phase of an environmental analysis that this study supplements.

Findings from this study indicate that the majority of whitewater recreationists on the Tieton River are patrons of commercial operations, they are predominantly rafters, and many are return users who rate the experience as good or excellent. Demographically, the users of the Tieton River are similar to water related recreationists nationwide. They range in age from 20 to 49 with an average age in the late 30's to early 40's. Most users have post high school education and work in white collar occupations. Many have total household incomes in the $30,000 to $60,000 range.

In general, recreationists are satisfied with the opportunities offered them and with the experience gained. Private users reacted strongly to factors affecting the social nature of the experience. Many more felt extremely crowded than did their commercial counterparts, but both groups are interested in the management of factors affecting their activities. Despite a desire to visit with others, crowding on the river has users concerned about decreased solitude, and is generating feelings that the experience is becoming commercial and somewhat unsafe. The number of inexperienced rafters on the river is of concern to some users. People falling out of their rafts enroute is worrisome, and crowds at take-outs are making it difficult to get out of the river comfortably. Users indicated a desire to see use on the river controlled, but favor management actions that rely on voluntary participation and self-regulation.

Data collected with this study and the related environmental analysis indicates that parking is crowded at many of the facilities currently being used. In some cases, a shortage of suitable parking has resulted in use of the shoulders of nearby State highway 12. This parking pattern has generated concerns among U.S.D.A.- Forest Service and Washington State Department of Transportation managers, as well as local and State law enforcement agencies.

Conclusions

The current level of whitewater recreation on the Tieton River is generating perceptions of crowding that indicate use is exceeding the social carrying capacity for the river. Related research indicates a high density experience exists and that management should consider dedicating the area to whitewater use even though the quality of the experience may suffer from crowding associated with the activity. If current use levels persist, some users will be displaced to other locations and other activities in lieu of whitewater

use. It should be noted, however, that these situations provide an opportunity to study those user reactions.

Anomalies exist between user responses and well established research relating to social carrying capacity. Despite high perceptions of crowding, many whitewater users report a high degree of satisfaction associated with their experience. It is reasonable to conclude that Tieton River whitewater activities are a positive social experience for many users. People enjoy socializing with members of their group and with people from other parties. Attributes associated with resource availability, accessibility, convenience, and management contribute to an experience that users repeatedly return to enjoy. Specific comments from individual users typically indicate a willingness to participate in the activity and in its successful implementation rather than an inclination to go elsewhere for whitewater recreation.

Additional study is desired to determine the validity of established research findings to the Tieton River. More information related to how impacts contribute to negative feelings about crowding and sharing the river with others would be valuable. Specific standards that indicate the limits of acceptable change to the setting and experience are also needed. In addition, more data is needed to improve the reliability of conclusions about the private user strata. Additional sampling would also allow the clustering of conclusions from separate user strata into one group.

As whitewater users requested, reduced crowding and improved facilities at launches and take-out locations is both feasible and desirable. Reduced crowding and congestion along the route is also a worthwhile goal. Measures that show the least amount of management control and allow voluntary, self-regulation could be implemented without significant controversy.

Data related to facility capacity and use indicates that a growing safety and quality of experience problem exists at parking areas. Undersized, user built facilities are causing overflow onto State highway 12. The entrance and exit routes associated with existing parking areas should be improved if the current parking scenario is to be perpetuated.

Discussion and Implications

The Tieton River is experiencing an escalating level of use that is contributing to user's perception of crowding in a negative way. As encounter levels increase, people are sensing greater inconsistencies between private and commercial user experience goals. These increased perceptions of crowding are manifested in a myriad of suggestions and concerns that relate to individual values not being met to the degree desired by the users. It is likely, for example, that there is a correlation between the suggestion that more launches and take-outs be developed and feelings about crowding. There appears to be a relationship between social and physical carrying capacities.

The implications are that managers need to determine what experience the system should offer and manage to provide that experience. Although this is an inherently social issue, there are related facility and improvement issues to be considered. The need to specify acceptable social impacts is imminent. Management objectives and judgements will need to consider the limits of acceptable change. Data related to crowding indicates that there is little time to make the necessary adjustments. Management action is needed to preserve the quality of the whitewater experience. It must be remembered that data for this study involved a small but reasonably indicative sample that blends user values from more than one set of users. Results indicate that users support appropriate management activities. The Naches Ranger District has a good rapport with the Tieton River users and those users have been assertive in regulating their own use. Management has been facilitated by the fact that these folks have a constructive attitude.

In this case, as in most situations involving social carrying capacity, the issues center around people's values rather than impacts to the natural resources. Management will have to make judgements and set

objectives that reflect the fact that the environment in which the activity is taking place is changing i.e. construction of a raft passage. We are seeking that level of use that best achieves the objectives of the recreation system. Possible management actions include efforts to disperse use, reduce encounters, and educate people about the values of others using the river.

Facility improvements that reduce crowded parking, launches, and take-out operations would have a positive effect on the recreation experience. These modifications would alter perceptions of crowding while addressing the suggestions and concerns expressed by those who responded to the sampling effort in this study. Management's approach to facility carrying capacity issues will probably include site hardening and facility improvements, as well as the designation of additional or different areas for use.

Recent efforts to reduce safety hazards associated with the Tieton Irrigation Canal Diversion Dam will reduce crowding at the dam and the delays associated with the portage that have occurred in the past. Impacts on local residents and administrative personnel will be mitigated and favorable changes in agency liability will occur. Many of the facility alterations necessary to address the needs of visitors can be accomplished by appropriate dollar investments. The implications are that available partnerships and funding should be investigated.

Visitor to staff ratio adjustments to increase involvement in permit administration are needed. Additional on-site presence would allow the observations and data collection needed for further refinements in management to occur.

The implications of data collected in the environmental analysis of outfitter guide permit issues indicates a need to increase coordination with other agencies and land owners. Safety and fire hazards associated with vehicles and large crowds at parking locations indicates a need to examine management options for staging operations away from critical areas and transporting users to and from key logistical locations. The fact that several critical take-outs are located on private and other agency land emphasizes the need for coordination with those land owners and managers. An effort to address fire risks, authorization for use, and the potential to expand the use of private land in the management of crowds is needed.

Adjustments to the procedures used in this study are also warranted. Management should attempt to strengthen its sampling of the user population to acquire sufficient data to test comparisons made between private and commercial users. This need can be efficiently addressed through additional data collection during the 1991 rafting season.

Recommendations

1. *Continue to work with the Bureau of Reclamation and the Tieton Irrigation Canal Company to construct a raft passage facility at the Tieton River Diversion Dam.*

2. *Work with commercial outfitter guides as well as private rafting and kayaking organizations to refine the schedule of launches and enhance self-regulation and voluntary registration.*

3. *Request the Bureau of Reclamation to re-examine flow regimes on the river. Seek opportunities to better control flow within the season as well as lengthen the season.*

4. *Freeze use at 1990 levels. Sample users during the 1991 season to measure the effects of management actions. Focus management on factors contributing to the problem conditions rather than anything attempting to establish carrying capacity. Seek additional information about conditions that will produce the desired quality of experience.*

5. *Examine the potential to utilize staging areas in safer locations with additional capacity for parking and camping. Maximize opportunities to use buses and other multipassenger vehicles to transport users.*

6. *Coordinate transportation and management plans with Washington State Department of Transportaion, Yakima Sheriffs Department, and the Bureau of Reclamation, as well as Plum Creek Timber Company and other land owners.*

APPENDIX

TIETON RIVER WHITEWATER AREA

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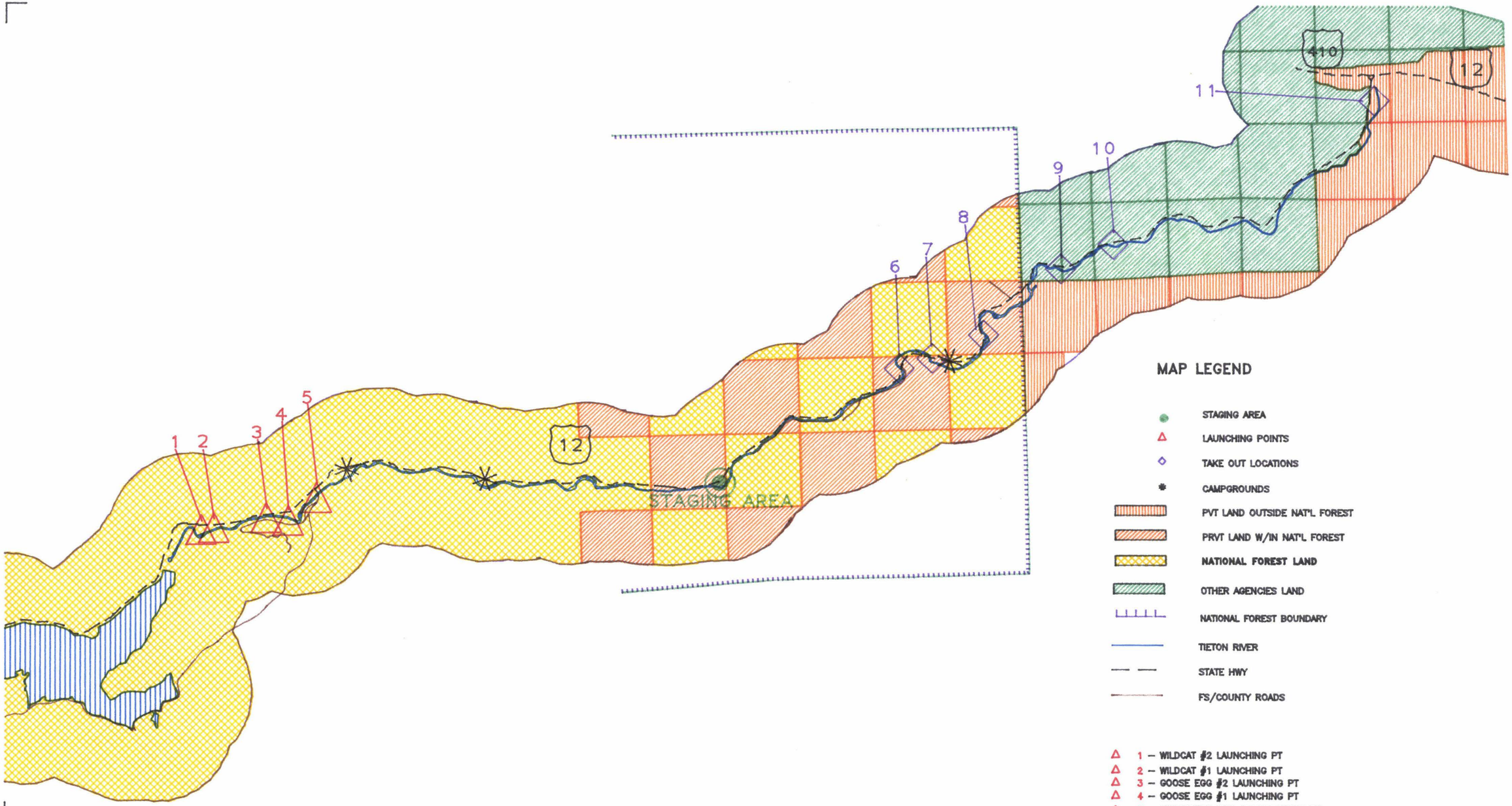

MAP LEGEND

- STAGING AREA
- LAUNCHING POINTS
- TAKE OUT LOCATIONS
- CAMPGROUNDS
- PVT LAND OUTSIDE NAT'L FOREST
- PRVT LAND W/IN NAT'L FOREST
- NATIONAL FOREST LAND
- OTHER AGENCIES LAND
- NATIONAL FOREST BOUNDARY
- TIETON RIVER
- STATE HWY
- FS/COUNTY ROADS

- 1 – WILDCAT #2 LAUNCHING PT
- 2 – WILDCAT #1 LAUNCHING PT
- 3 – GOOSE EGG #2 LAUNCHING PT
- 4 – GOOSE EGG #1 LAUNCHING PT
- 5 – GOOSE EGG SNO–PARK LAUNCH PT
- SPRING HILL STAGING AREA
- 6 – WINDY PT WEST TAKEOUT
- 7 – WINDY PT EAST TAKEOUT
- 8 – BEAR CANYON TAKEOUT
- 9 – NISSON WEST TAKEOUT
- 10 – NISSON EAST TAKEOUT
- 11 – THE "Y" TAKEOUT

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TOGIS

TIETON RIVER VISITOR USE STUDY
CLEMSON UNIVERSITY

1) *Was your last trip on the Tieton River with a commercial guided river running outfit?*
   _____*Yes*
   _____*No*

2) *How many times (total) have you floated the Tieton River? (circle one)*
   1 2 3 4 5 6-10 11-15 16+

3) *About how far away from the Tieton River is your home?* _____ *(miles)*

4) *Did you feel the area was crowded?*

1	2	3	4	5	6	7	8	9
not at all		*slightly crowded*		*moderatly crowded*			*extremely crowded*	

5) *On the average, about how many times per trip did you see other parties floating the river? If you saw the same party more than once, count each occasion separately.*
   I actually saw floating parties about _____*times each trip.*

6) *The following is a list of things you may have seen or experienced on your Tieton River trip. For each, indicate how much it added to or detracted from the quality of your trip.*

	Did Not Encounter	***Added To***	***Neither Added Nor Detracted***	***Detracted***
Litter along the river bank	_____	_____	_____	_____
Wildlife	_____	_____	_____	_____
Homes or other buildings	_____	_____	_____	_____
Bridges	_____	_____	_____	_____
Large Trees	_____	_____	_____	_____
Seeing other boaters (besides your group)	_____	_____	_____	_____
Getting wet	_____	_____	_____	_____
Clear water	_____	_____	_____	_____
Visiting with boaters outside your party	_____	_____	_____	_____

7) *If seeing or encountering river floaters other than those in your group either added to or detracted from your trip, please explain why.*

8) *Overall, how would you rate your trip?*

_____*Poor, it just didn't work out very well.*
_____*Fair, but I wish a number of things could be different.*
_____*Good, but could have been better.*
_____*Excellent.*

9) *What, if anything, could be done to improve the quality of a trip on the Tieton River?*

10) *The following actions could be used to maintain a desired level of use on the Tieton River if use levels increase to an undesirable level. Please indicate you preference for each:*

Possible Management Actions	*Favor*	*Don't Favor But Would Accept*	*Not Acceptable*	*No Opinion*
Voluntary registration to help the Forest Service monitor use levels	____	_____	_____	_____
Mandatory registraion to help the Forest Service monitor use levels	____	_____	_____	_____
Limit on the number of watercraft per float party	_____	_____	_____	_____
Limit on the number of people per float party	_____	_____	_____	_____
Voluntary scheduling of launch times	_____	_____	_____	_____
Mandatory scheduling of launch times	_____	_____	_____	_____
Limit number of float parties per day	_____	_____	_____	_____
Limited commercial use but unlimited private use	_____	_____	_____	_____
A mandatory permit system to accomplish all of those above	_____	_____	_____	_____

11) *Do you have any suggestions for maintaining desired use levels? Please explain.*

12) *Now a few questions about yourself:*

What is your age? _____ (years)

Your sex? _____*Female* _____*Male*

How many years of education have you completed? (circle last year completed)

GRADE SCHOOL	*1 2 3 4 5 6 7 8*
HIGH SCHOOL/VOCATIONAL SCHOOL	*9 10 11 12*
COLLEGE OR TECHNICAL SCHOOL	*13 14 15 16*
GRADUATE SCHOOL	*17 18 19 20+*

What was your total household income before taxes last year?

____ *less than $10,000*
____ *$10,000 to $19,999*
____ *$20,000 to $29,999*
____ *$30,000 to $39,000*
____ *$40,000 to $49,999*
____ *$50,000 to $59,999*
____ *$60,000 to $69,999*
____ *$70,000 to $79,999*
____ *$80,000 or above*

What is your present or most recent occupation?

THANK YOU!

TIETON RIVER VISITOR USE STUDY
CLEMSON UNIVERSITY

1) *Was your last trip on the Tieton River with a commercial guided river running outfit?*
_____*Yes*
_____*No*

2) *How many times (total) have you floated the Tieton River? (circle one)*
1 2 3 4 5 6-10 11-15 16+

3) *About how far away from the Tieton River is your home?* _____ *(miles)*

4) *Did you feel the area was crowded?*

1	2	3	4	5	6	7	8	9
not at all		slightly crowded		moderatly crowded			extremely crowded	

5) *On the average, about how many times per trip did you see other parties floating the river? If you saw the same party more than once, count each occasion separately.*
I actually saw floating parties about _____*times each trip.*

6) *The following is a list of things you may have seen or experienced on your Tieton River trip. For each, indicate how much it added to or detracted from the quality of your trip.*

	Did Not Encounter	***Added To***	***Neither Added Nor Detracted***	***Detracted***
Litter along the river bank	_____	_____	_____	_____
Wildlife	_____	_____	_____	_____
Homes or other buildings	_____	_____	_____	_____
Bridges	_____	_____	_____	_____
Large Trees	_____	_____	_____	_____
Seeing other boaters (besides your group)	_____	_____	_____	_____
Getting wet	_____	_____	_____	_____
Clear water	_____	_____	_____	_____
Visiting with boaters outside your party	_____	_____	_____	_____

7) *If seeing or encountering river floaters other than those in your group either added to or detracted from your trip, please explain why.*

8) *Overall, how would you rate your trip?*

_____*Poor, it just didn't work out very well.*
_____*Fair, but I wish a number of things could be different.*
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Limit on the number of people per float party	_____	_____	_____	_____
Voluntary scheduling of launch times	_____	_____	_____	_____
Mandatory scheduling of launch times	_____	_____	_____	_____
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